



GRAVOTECH

Technifor Dot peen & scribing styli guide

Introduction

Technifor offers the most important range of styli on the market:

- 39 pneumatic
- 24 electromagnetic
- 15 scribing

It's a significant asset we have for the customers and must be highlighted because each stylus has its own features to answer each customer need the best way.

Here is a guide to detail the offer we have and explain when to use each stylus.

What's new in our styli range?

I. We have increased the customer's choice in dot peen pins and styli:

More pneumatic & electromagnetic pins are now available in 60, 90 and 120°.

II. We have improved our brand image and prevented risks during transportation of the pins

Every pneumatic & electromagnetic pin is now packaged in a separated solid plastic box with a protective foam.

III. We are simplifying the styli and pins orders

Simple naming rule applied in JDE for all the references of pins & styli.

Summary document with all the references for the whole styli and pins range.

IV. We are helping the customer to choose the right stylus

Update of this guide to know which stylus to use in what application.

V. We launched 2 new styli

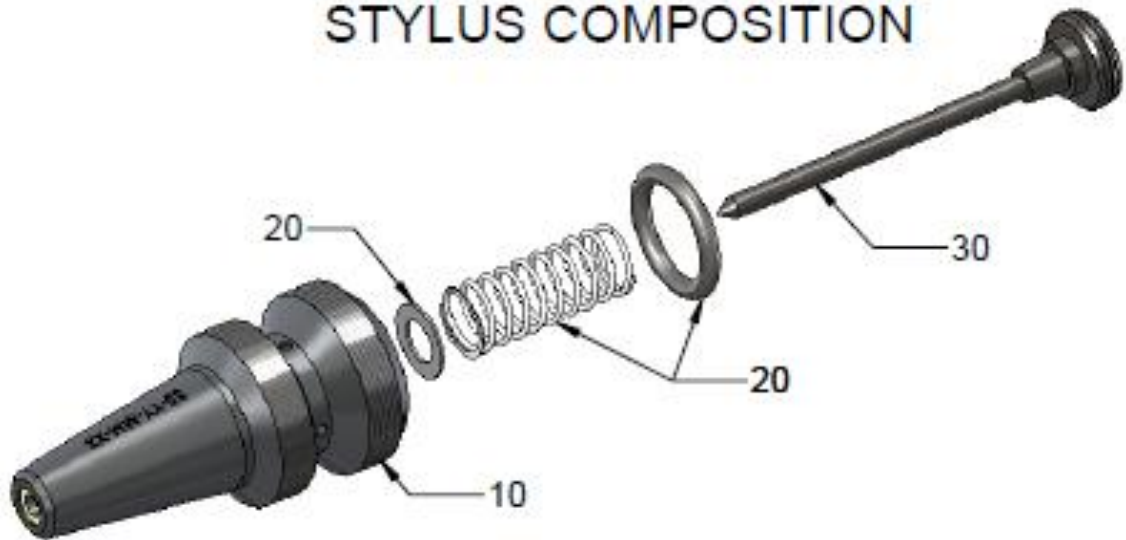
M1HR Electromagnetic stylus & High stroke Pneumatic "3D" stylus available.



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Pneumatic Stylus Guide

Pneumatic stylus composition



- 10: Stylus body
- 20: Repair kit
- 30: Pin

Dot peen pneumatic styli and pins

Every dot peen pneumatic stylus name starts with a « **S** » or a « **PN** », plus potentially other letters according to the type of stylus:

- S: Standard
- SA: Extended
- SSA: Extra Extended
- SAA: Enhanced Amplitude
- PN: for benchtop & hand held machines

Then, there are the:

- Piston size: 1 number = 1 head diameter (classified from 0 to 5)
- Pin Radius: 1 number = 1 pin radius (classified from 0 to 5)
- Pin angle (60, 90 or 120°)
- If reinforced (HRS), add a « + » in the end of the name

Finally, if it's a pin only, add a « R » before the name

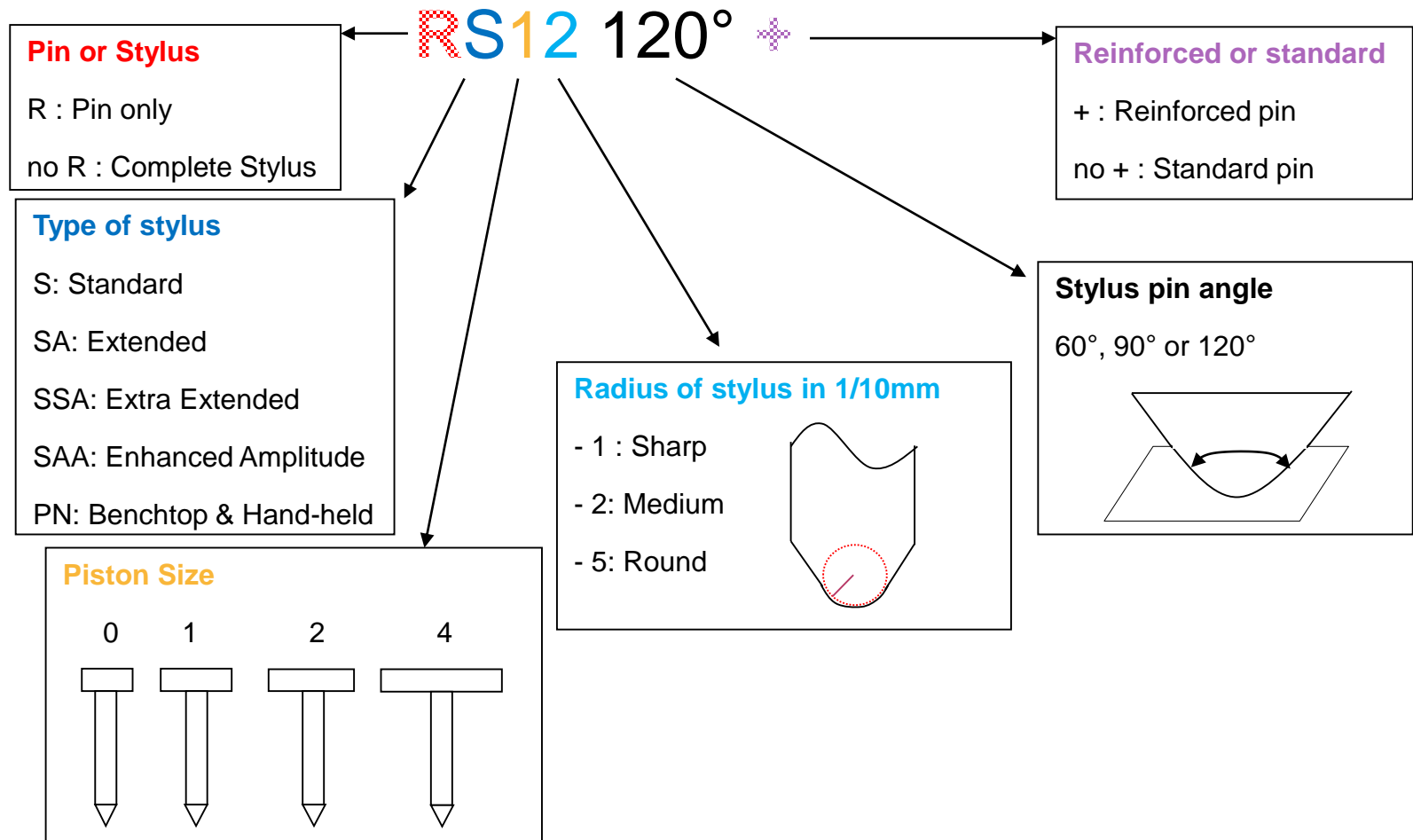
For instance:

RS22 90° + : Reinforced standard pin, piston size=2, pin radius=2, pin angle=90°

S12 60° : Standard stylus, piston size=1, pin radius=2, pin angle=60°

Summary of pneumatic stylus name

Every pneumatic stylus or pin name follows this rule :



Choosing a piston size

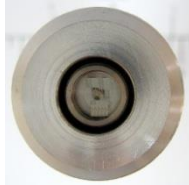
Size 0

Dia.= 6.65mm



Size 1

Dia.= 10.00mm



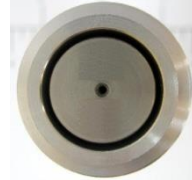
Size 5

Dia.= 13.70mm



Size 2

Dia.= 16.25mm



Size 4

Dia.= 36.55mm



- Piston diameter is directly linked to the impact force and to the marking depth
- The only size 4 stylus is S45, compatible with XF530p only
- The only size 5 stylus is S52. It is actually not a real size 5 but a size between 1 and 2

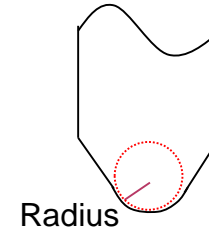
Needs/ Application	Advised Piston				
	S0	S1	S2	S4	S5
Plastic or soft materials	X	X			
Small characters	X	X			
Thin materials	X	X			
Deep marking			X	X	
Steel or Cast iron			X	X	
Rough cast surface			X	X	
Very fast marking					X

Choosing a pin radius

Size 1: sharp radius (0.1mm)

Precise small and light marking

Fast wear on hard material



Size 2: medium radius (0.2mm)

Standard marking

Size 5: round radius (0.5mm)

Large marking,

Recommended for rough surfaces

Needs/ Application	Advised Radius		
	0.1	0.2	0.5
Light marking	X		
Small characters	X		
Datamatrix		X	
Deep marking	X	X	
Plastic or soft	X	X	
Rough cast surface			X

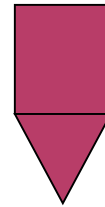
Choosing a pin angle

60° Angle

Really precise small characters and DMX

Deep marking

Fast wear on hard material



60°



90°



120°

90° Angle

Standard marking

Compromise between wear and ability to

mark small characters or DMX

120° Angle

Large marking

Recommended for rough surfaces

Low wear

Low risk of pin breakage

Needs/ Application	Advised Angle		
	60°	90°	120°
Deep Marking	X	x	
Small Datamatrix	X	x	
Large Datamatrix		x	X
Rough Surface		x	X
Small Characters	X	x	

Our whole pneumatic styli range

Stylus	Asset
S01	Recommended on soft material (aluminium) for shallow, precise and thin marking (small DMX and characters)
S02	Same than S01 but less wear, larger and less deep marking
S11	Shallow & thin marking
S12	Very good frequency but low amplitude: for high speed marking
SA12	Same than S12 with an extended length
SAA12 (HRS)	Size 1 stylus with the best amplitude: can absorb important planarity default (ideal for non-flat parts)
S15	Important radius, recommended for parts that need painting after: will do large but not deep impact
SD15	Marking on very hard material but with very low marking depth
S52 (HRS)	Best stylus of the market: unrivalled marking Quality at very high speed thanks to its high natural frequency & amplitude
S22	A versatile stylus answering practically every need
S22 (HRS)	Same than S22 but with a longer life or for harder material
SA22	Same than S22 with an extended length
SA22 (HRS)	Same than SA22 but with a longer life or for harder material
SAA22 (HRS)	Size 2 stylus with the best amplitude: can absorb important planarity default (ideal for non-flat parts)
SSA22-LG85 (HRS)	Reaches difficult area but extended length may lower precision (not for precise DMX and small characters)
SSA22-LG96 (HRS)	Reaches difficult area but extended length may lower precision (not for precise DMX and small characters)
S45	For XF530p only, rough surface and large marking

Low marking depth

High marking depth

Pneumatic marking general advices

Once the stylus has been selected, other settings can be used to fine-tune the marking result:

Marking speed: by increasing or decreasing the speed, density changes. The resulting number of impacts affects both the appearance and depth of the mark.

Air pressure: **maximum of 6.5 Bar** for extra depth, **minimum of 4 Bar** to have lighter marking. For optimized frequency and amplitude, use with 6 Bar (for S45: 7 Bar). Impact machines can accept a pressure down to 2.0 Bar.

Number of air valves: the force setting in the software controls the number of air valves (from 1 to 3). Adjustment can increase or decrease the force of impact and frequency. For a good marking Quality, avoid using 25% force (except for S0 and special applications).

Part-pin distance: Each stylus has a natural amplitude, frequency and optimum part-pin distance. Bringing the stylus closer to the part won't decrease cycle time:

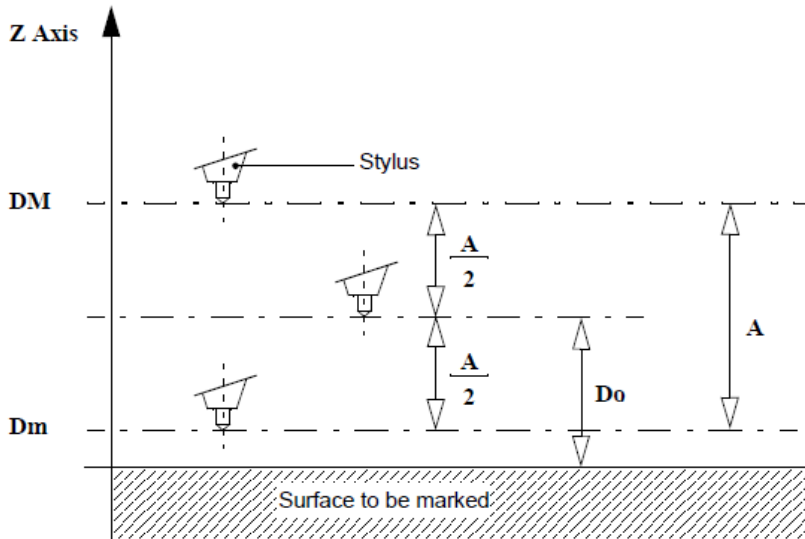
- Too close and the pin can't vibrate
- Too far and the part will not be marked

Tip: The closer to the part the pin, the more high-pitched the marking noise.

→ Refer to the following slide to know the amplitude and optimum part-pin distance for each stylus.

- Except S45, all the styli are interchangeable on the 5th range machines

Styli optimum parameters



Values are in mm,

- A: Amplitude
- **D₀: Optimum distance of adjustment** (to get the maximum amplitude)
- D_m: Minimum distance of adjustment
- D_M: Maximum distance of adjustment
- Pressure: 6 Bars
- Force: 100% (for S0: 50%)

Stylus type	A	D0
S0X	1.7	3.1
S1X	3.0	3.5
SA1X	2.9	3.4
SAA1X	3.4	3.6
S2X	4.8	5.2
SA2X	4.7	5.1
SSA22-LG85	4.7	4.9
SSA22-LG96	4.5	5.0
SAA2X	5.9	5.6
S45	6.2	6.4
S52	6.8	5.6

Focus on the 3D stylus

This new stylus is a dot by dot tool, like an electromagnetic stylus, but using air

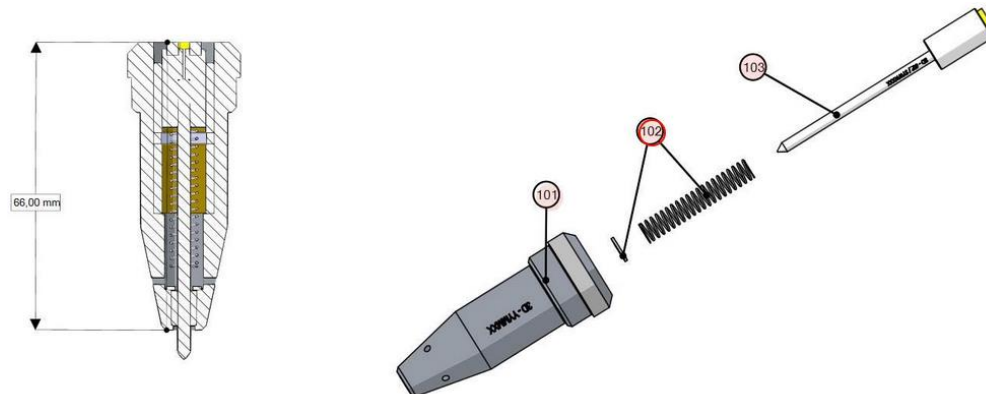
Air pressure: 2 Bar for the XF510p range and the Impact, 3 Bar for XF500.

Compatibility: can be used with all new pneumatic machines (excepted XF530p). For existing machines, they may need to be equipped with compatible solenoid valves (see product Information N°342). Available with 60°, 90°, 120° pins.

Part-pin distance: from 2 to 18 mm (16mm amplitude). Optimal distance is 10 mm on a flat part.

Pros: easy to integrate, silent, 5x7 and DMX quality, deeper than S2 (but slower), cost effective (uses 66% less compressed air, at low pressure)

“All terrain stylus”: marks raw or sloppy parts, can replace a DMC for great diameters, can reach areas in holes, can compensate variations in part shape or positioning.

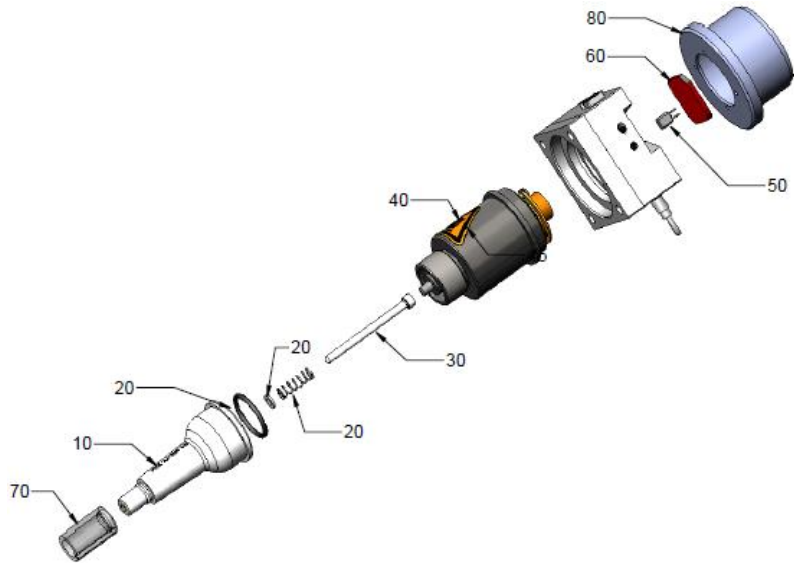




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Electromagnetic Stylus Guide

Electromagnetic stylus composition

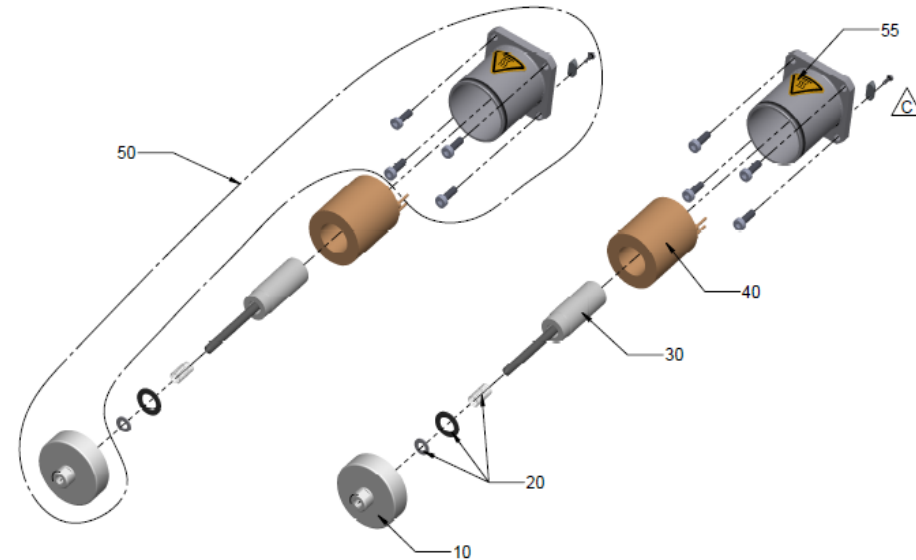


M1 electromagnetic styli

- 10: Stylus body
- 20: Repair kit
- 30: Pin
- 40: Coil set + safety sticker
- 50: Thermistor
- 60: Shock absorber
- 70: Safety spacer (optional)
- 80: Cooling option

M2S Stylus

- 10: Coil plug
- 20: Repair kit
- 30: Pin
- 40: Coil set
- 50: Short body set
- 55: Safety sticker



Dot peen electromagnetic styli & pins

5 points about Electromagnetic styli and pins:

- Every dot peen electromagnetic stylus name starts with a « **M** »
- **All the EM pins are reinforced (HRS)**, so they all have a « + » at the end of their name
- Except for M2S stylus, **all the Electromagnetic styli use the same pins** (so pins are interchangeable between all the EM styli)
- All the pins are available in 60°, 90° and 120°
- **Some styli are dedicated to one machine**

Summary of Electromagnetic styli and pins designation

Stylus	Machine	Feature	Pin
M1C for XF500m	XF500m	Standard stylus for XF500m	RM1 60° + RM1 90° + RM1 120° +
M1X for XF510Cm	XF510Cm	Standard stylus for online range	
M1X for XF510Sm & XF510Dm	XF510Sm XF510Dm	Standard stylus for online range	
M2X for XF530m	XF530m	Deeper than M1X stylus	
M1HR	XF510Cm XF510Sm XF510Dm XF530m	M1X with a reinforced coil, lasts 10 times longer than a M1HR: ideal for high marking rate applications	
M2S for XM700	XM700	EM stylus with the best depth but slow	RM2S 60° + RM2S 90° + RM2S 120° +

- Every 5th generation EM styli are using the same reinforced pins.
- M2S Stylus has got its own pin.
- **Every stylus name includes the machine it is working with (except M1HR because it can be mounted on 4 different machines)**

Our whole electromagnetic styli range

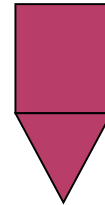
- Each stylus needs the right parameters, from a configuration file (Conf500).
- Always ensure to use the right parameters or it may damage the stylus and even the power board.

Stylus	Machine	Asset
M1C for XF500m	XF500m	Standard stylus for XF500m
M1X for XF510Cm	XF510Cm	Current online range
M1X for XF510Sm and XF510Dm	XF510Sm, XF510Dm	Current online range
M1HR for all XF510m range	XF510Cm, XF510Sm, XF510Dm	Same than M1X with a lifetime 10 times more important
M2X for XF530m	XF530m	Larger and deeper impact than M1X
M2S for XM700	XM700	EM stylus with the best depth but needs more cooling

Choosing a pin angle

60° Angle

Really precise small characters and DMX
Deep marking



60°



90°



120°

90° Angle

Standard marking
Compromise between wear and ability to mark small characters or DMX

120° Angle

Large marking
Recommended for rough surfaces
Low wear
Low risk of pin breakage

Needs/ Application	Advised Angle		
	60°	90°	120°
Deep Marking	X	x	
Small Datamatrix	X	x	
Large Datamatrix		x	X
Rough Surface		x	X
Small Characters	X	x	

Electromagnetic marking general advices

Once the stylus has been selected, other settings can be used to fine-tune the marking result:

Force: Adjustment is really precise (0 to 100%). The repeatability and ability to finely tune the marking using force settings makes EM the preferred choice for critical applications in Aerospace and Medical.

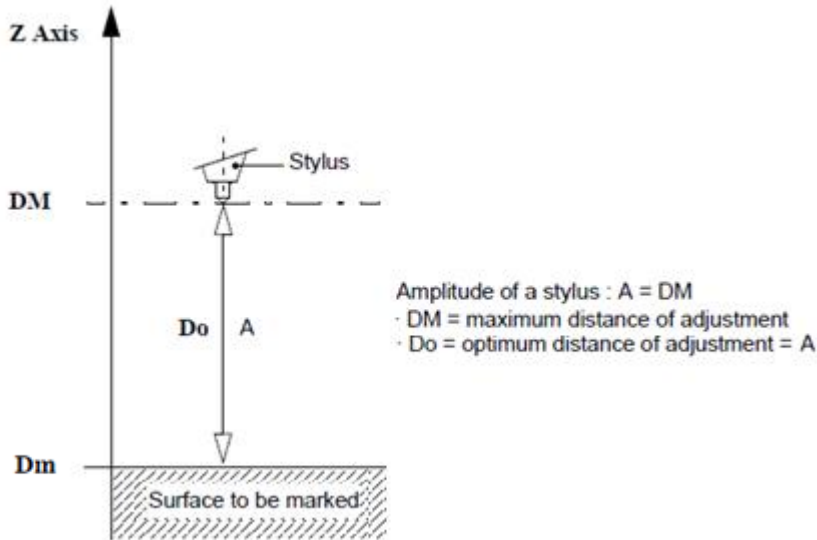
- Reducing force will reduce the maximum amplitude

Dots density: the space between dots can be adjusted thanks to this parameter (only for continuous fonts and logos)

Part-pin distance: each stylus has a natural amplitude. Proper adjustment is critical for a good result:

- too close and depth won't be important enough
 - too far and the stylus will be damaged
- Unlike Pneumatic, increasing the part-pin distance will increase the marking depth, thanks to kinetic energy.

Styli optimum parameters



Values are in mm:

- A : Amplitude
- D_0 : Optimum distance (to get the maximum amplitude)
- D_M : Maximum distance of adjustment before damaging the spring ($=D_0$)
- Force: 100%

Stylus type	$A = D_M$
M1C for XF500m	7.0
M1X for XF510Cm	7.0
M1X for XF510Sm & XF510Dm	7.0
M1HR for all XF510m range	7.5
M2X for XF530m	6.0
M2S for XM700	6.5

In EM, there is no minimum distance of adjustment (D_m) because you can mark even if the pin is really close to the part. It means that if you want the best amplitude, you need to be as far away from the part as possible (at the distance D_M).

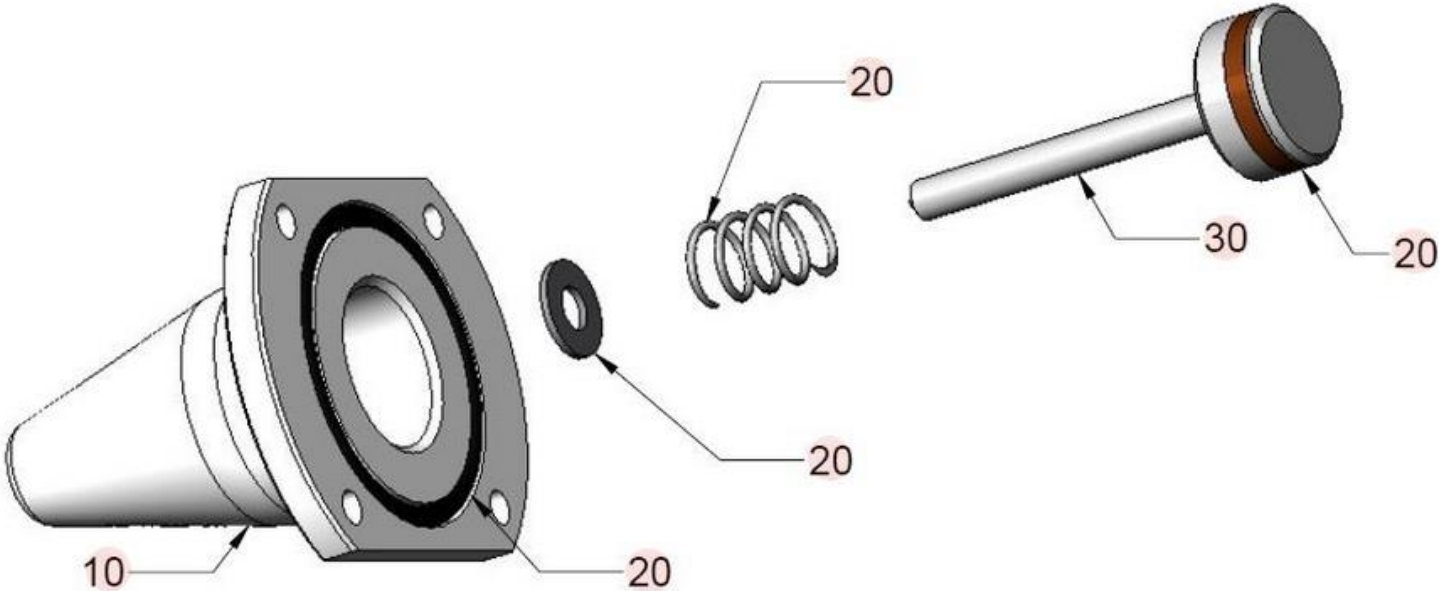
- **Be careful to never exceed D_M or you will damage the spring.**



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Scribing Stylus Guide

Scribing stylus composition



- 10: Stylus body
- 20: Repair kit
- 30: Pin

Scribing styli & pins

5 points about scribing styli and pins:

- Every scribing stylus name starts with a « **N** », except the **V22**, the **SV510** dedicated stylus, which was originally designed for **VIN** marking. Add a « **R** » to name the corresponding pin.
- The (optional) **A** letter stands for extra length
- The (optional) **D** letter stands for **diamond** pin (instead of carbide). Choose diamond for hard materials but avoid dot by dot (5x7, DMX, ...) markings which may break the pin.
- All the pins are available in 110°, and the **RV22** is also available in 130°
- Air consumption is reduced compared to dot peen (no continuous exhaust), pressure can vary from 2 to 6 bar. (up to 8, but then a bigger stylus with a lower pressure is a better choice)

Summary of scribing styli name

Every scribing stylus or pin name follows this rule :

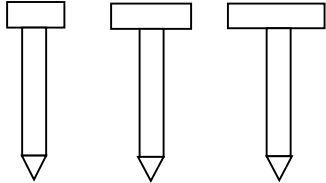
RNA**12** 110°

Pin or Stylus
R : Pin only
no R : Complete Stylus

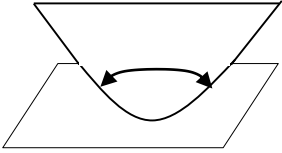
Type of stylus
N: Standard
NA: Extended
ND: Standard+diamond pin
NDA: Extended+diamond pin
V: SV510 stylus

Piston Size

0 1 2

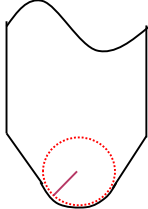


Stylus pin angle
110°, 130°, custom



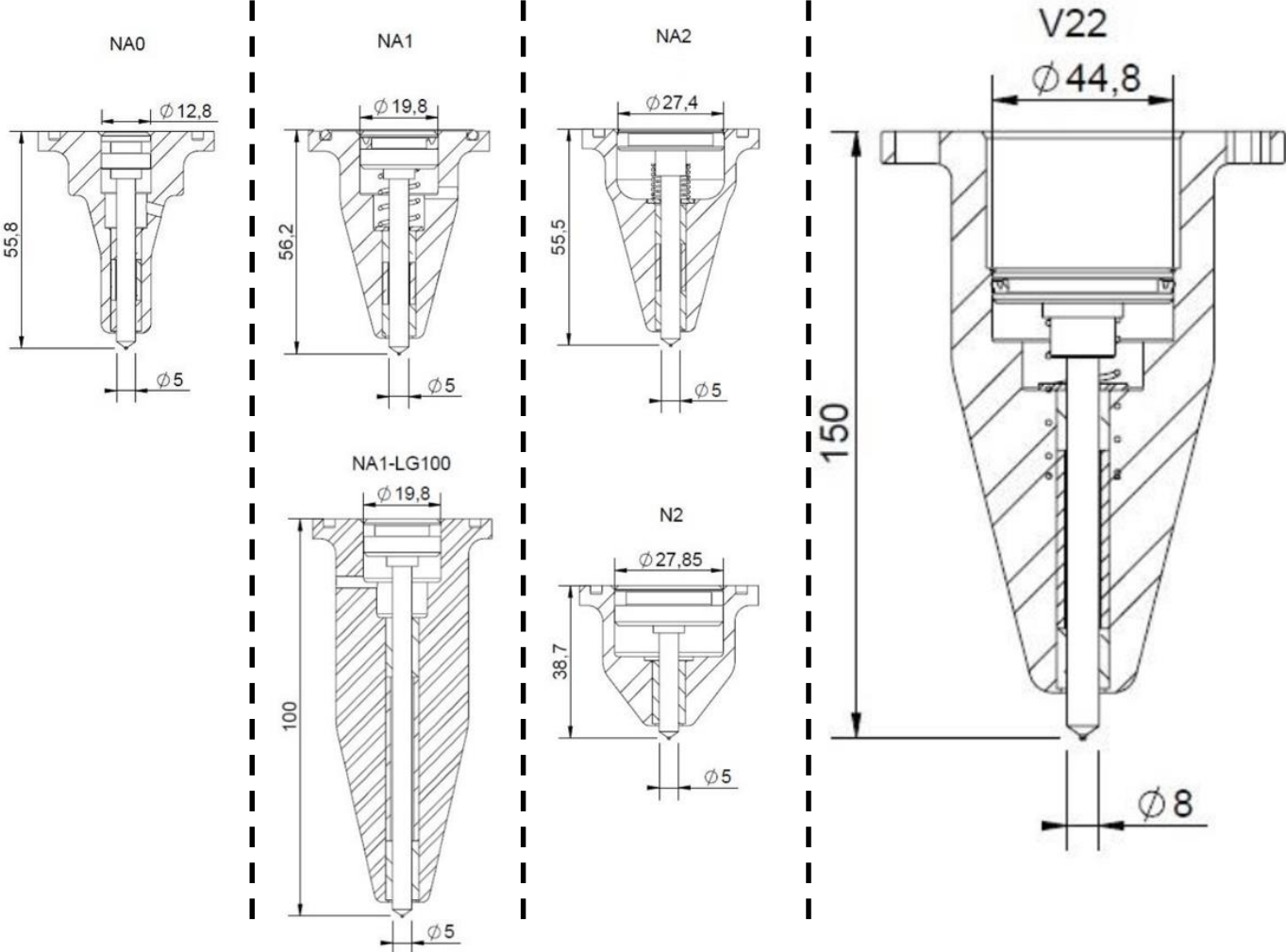
Radius of stylus in 1/10mm

- 2 : Sharp
- 7: anti burr
- x: custom



Compared sizes (mm)

The whole range at a glance:



Scribing marking general advices

Once the stylus has been selected, other settings can be used to fine-tune the marking result:

Marking speed: increasing the speed will reduce the marking depth and the characters edges won't be so sharp.

Air pressure: Always prefer a bigger stylus with a lower pressure, mainly for compressed air cost savings. Force ranges of the different styli are overlapping. (see next page) On some materials, the machine may not be able to scribe with the highest pressure. Always perform a validation test.

Stylus to be used	Pressure (Bar)							
	1	2	3	4	5	6	7	8
NA0	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes
NA1 - NA1 LG 100	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No
N2 - NA2	Yes	Yes	Yes	Yes	Yes	No	No	No

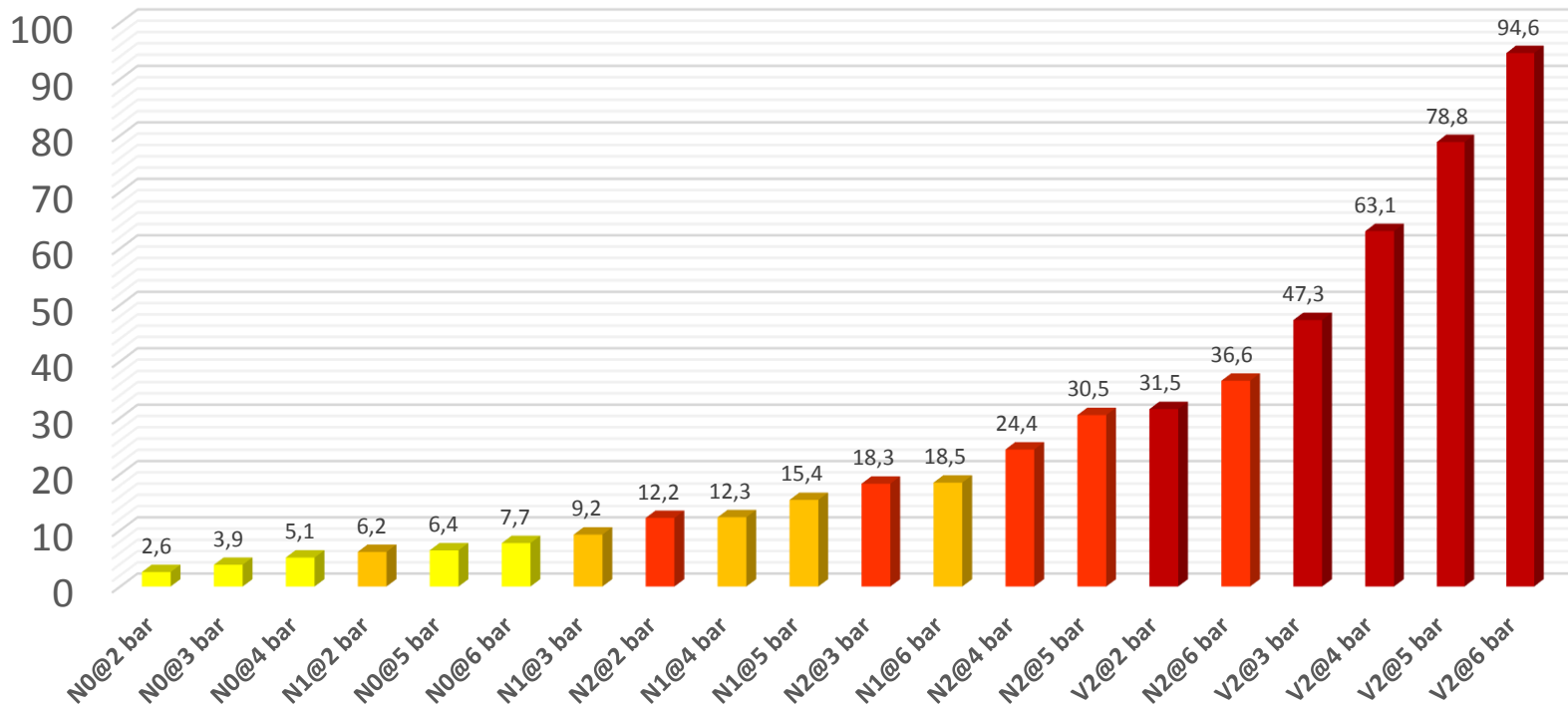
Clamping: this is the key for a good marking quality. Each axis (X, Y, Z) must be able to handle the force produced by the stylus against the part (see next page). Scribing is easier on flat and regular parts than on rough material.

Part-pin distance: : 0.5 to 3mm (1 to 6mm for V2). As a general rule, it's better to put the part as close as possible to the pin. There will be less efforts on the pin guiding, which means slower wear of the stylus. But dot by dot marking may require more distance if a bigger impact is needed.

DMX Kit: should you need dot by dot and scribing, select the DMX kit (52877) to use two different pressures for dot by dot and scribing.

Scribing styli forces

Vertical force (Kilograms)



- Two different styli at different pressures can produce the same downforce.
- This force can be directed on any axis (X, Y, Z) when the machine scribes, integrators have to take this into account for head fixture and part clamping.